Enhancing Teaching (and Learning?) with On-Line Courseware

Philip J. Parker, Christina Curras, and Michael R. Penn

Department of Civil and Environmental Engineering

University of Wisconsin-Platteville

1 Introduction

In this paper, we discuss our use of "Blackboard," an on-line courseware that we have implemented in several of our courses. The purpose of this paper is to provide the reader with ideas for implementation. We specifically address how the various tools in Blackboard impact teaching and learning, and note the time commitments involved.

2 Background

The University of Wisconsin-Platteville (UWP) has one of the largest undergraduate-only engineering programs in the United States. The civil and environmental engineering (CEE) department graduates approximately 100 students each year, and the relatively new environmental engineering degree program (housed within the CEE department) is steadily growing. CEE students begin their studies by enrolling in the General Engineering department, in which they complete their introductory engineering requirements.

Blackboard is a popular web-based program designed to enhance or fully replace traditional face-to-face classroom teaching. Blackboard is very easy to use and requires no knowledge of HTML or other types of programming; the tradeoff is that it is also relatively inflexible. According to the product's web site (www.blackboard.com), Blackboard is used at thousands of institutions in 145 countries. UWP hosts its own site (blackboard.uwplatt.edu) which is managed by the UWP Learning Technology Center.

3 Blackboard tools

Blackboard has a variety of tools that can be used by university faculty, and in this section we describe those tools that we have used in our instruction.

1. The **Digital Dropbox** allows students and instructors to exchange files. A student can upload a file from a local machine or disk drive to Blackboard. The instructor can then access this file, view and/or grade the file, and return the original or a modified file to the student. Note that since the Blackboard site is secure and students must log in with a unique password, the student's privacy is ensured. Deleting files from the dropbox is a tedious process.

2. The **Online Gradebook** allows faculty to enter grades on a single site that students can access. Several interfaces are available for the instructor (or grader) to enter in grades, but we have found the "spreadsheet view" to be most helpful.

The instructor is allowed to weight certain scores, but otherwise the spreadsheet is very limited and does not allow cell calculations. Also, the spreadsheet can be exported and parsed in Excel or Quattro Pro. Upon logging in, the student only sees his or her grades and the class average for each assignment.

3. The instructor can form students into teams using the **Group** function. This allows students to exchange files and communicate with team members via e-mail or bulletin board. The instructor can manage teams, and monitor their activity.

4. Blackboard has several useful **E-mail** applications. For example, upon logging in, students can e-mail the instructor or another student in the course. Or, the instructor can e-mail individual students, a group of students, a student group, or the entire class.

5. The instructor can use the **Course Documents** function to post files of interest for the students. Files can be organized in folders, and adding and deleting files are very simple tasks. With only a few mouse clicks, students can view, save, or print the file.

6. Providing students with links to web sites of interest is possible using the **External Links** option. As with Course Documents, the instructor can organize the links in folders. Adding a link is as simple as typing a title and descriptive text (optional), and then copying and pasting the link address in a text box.

7. Using the **Announcement** function, instructors can provide students with a message that they will view on the first screen they see when logging in.

4 Specific Applications

In the following sections, we describe various applications of Blackboard in our courses, assess the impact on teaching *and* learning, and discuss the costs involved in implementation.

4.1 *CE212: Computer Applications for Civil and Environmental Engineers*

CE 212 is a required sophomore level course intended to increase students' computer skills and problem solving skills. The newly taught computer skills are used to solve a variety of engineering and engineering-related problems. The bulk of the time is divided between three computer programs – Microsoft Excel, Mathcad by Mathsoft, and Autocad's Land Development Desktop.

Blackboard is used extensively in this class. Example files, data files, etc. are posted in Course Documents for students to download. For exams, "input files" containing data are made available for students so that their time is not spent entering data. The instructor can set the time for which files are available to students; in the case of exam input files, they are only available for the hour in which the exam is given.

Students submit all Excel files (homework and exams) in the Blackboard Drop Box. Graders and instructors can then access the files, grade them, and return them to the students privately. While Blackboard's file management structure could be set up more efficiently, it does provide an easy, secure way for files to be submitted. When using graders for a class, it also eliminates the need to pass files around on a floppy disk. Blackboard notes the date and time the file is submitted which makes it very easy to enforce late policies.

Being able to see the students' actual Excel files instead of just a printout of their results is extremely important in a class such as this. Instead of just seeing if the results appear right or wrong, graders and instructors are able to check the students' actual work and see where they went wrong. Formulas, macros, etc. can be checked and corrected.

This course could not be readily taught without a tool such as Blackboard for file management. However, we have noted some drawbacks, primarily that the management of the files is primitive and inefficient. The inefficiency is noticeable due to the large number of files submitted in CE 212. After only a few weeks, the dropbox holds several hundred files, corresponding to the submitted *and* graded files of 40 - 50 students handing in three assignments per week. Files are listed in reverse chronological order corresponding to the time of submission, and the more recent versions of Blackboard do not allow the assignments to be sorted by student name or assignment number. This makes searching for an individual file time consuming. The obvious solution is to delete the files before the dropbox becomes too large. However, files must be deleted one at a time, and coupled with the slow response time of the dropbox, deleting 100 files can take more than one hour.

The use of Blackboard for transferring exam files necessitates students to be on-line when taking exams. This opens the door for various cheating opportunities. Students can use old homework files as templates, e-mail a friend for help, etc.

Also, all course grades were entered into Blackboard's Gradebook. This is very simple, since the class roster is automatically entered by the Learning Technology Center, and entering grades takes the same amount of time as entering them into Excel or Quattro Pro. The only additional time required is in exporting the file. Students benefit from the Gradebook in that they can review their grades at any time and have no excuse for not knowing their standing in the course. One benefit to the instructor is that students can let the instructor know when a certain grade has been entered improperly, and in general student awareness of their grades is beneficial. Also, when reviewing grades with a student, the instructor can select only that student's grades, ensuring the privacy of the other students enrolled in the course.

4.2 *CE 373: Geotechnical Engineering I*

CE 373 is an introductory soil mechanics course, required for all students and generally taken in the junior year. CE 373 has two lectures and one lab every week.

Blackboard was primarily used for a one way transfer of information – from the instructor to the students. Lab data and reading, homework, and lab assignments were posted on Blackboard. As with CE 212, the course grader inputted all grades into Blackboard.

The time needed to manage the class via Blackboard was small, as it only takes a minute or two to post an assignment or file. However, the impact on student learning is also small, with the primary benefits being the availability of data. Blackboard was beneficial to the instructor in the sense that students could no longer say "I lost the assignment, can I have another copy?" and had no excuse for not knowing the reading and homework assignments.

4.3 *CE 433: Solid and Hazardous Waste Engineering*

CE 433 is a senior-level environmental engineering course with typical enrollments between 10 and 20. This elective course consists of eight modules, with each module culminating in a design or research project. Half of the module assignments are performed in teams.

Use of the Group function was optional for students, and has not been used regularly. However, one group in particular found it very useful to exchange files since the group consisted of members with busy and conflicting schedules. Creating groups takes roughly 2-3 minutes per group. No impact on teaching was identified, and it is doubtful that the group function impacts learning; however, it undoubtedly has a positive impact on file transfer and communications for groups with busy members.

Many of the projects required that students have access to sets of data collected in laboratory periods, and the Course Documents function was very useful in this regards. Students found this very helpful, and submitting a single data file to Blackboard takes a negligible amount of time on the instructor's part. The Course Documents function was also used to provide students with the grading rubric which they could download prior to writing the project report. This had a positive impact on learning, in that students could keep the criteria for grading in mind as they wrote; moreover, this rewarded the students who took the time to log in and download the rubric.

Many topics in CE 433 require that students (and instructor) are aware of current events in the field, and folders were created for various modules (e.g. composting and recycling) that contained a variety of useful web site links. The largest time commitment involved finding and reviewing sites, and adding a dozen sites to a folder in the External Links area took approximately 15 - 20 minutes. This made teaching easier in the sense that the sites are readily available to students and can be "recycled" from one year to the next. Also, a series of assignments were created based on the web sites, wherein students gave presentations to the class on the material that was available in a web site that they selected from the folder.

Also, all course grades were entered into Blackboard's Gradebook.

4.4 *ASCE Student Group Management*

Two of the authors, Dr. Parker and Dr. Curras, advise the American Society of Civil Engineers student chapter. This is a large (more than 100 members) and very active student organization.

Blackboard has been used effectively in managing this group. Whenever a new member joins ASCE, a student volunteer adds that member to the Blackboard site.

The chapter takes part in several activities/competitions throughout the year, and has been organized into more than 10 committees (e.g. Concrete Canoe Competition, Fund Raising, Community Outreach, etc.). A Blackboard Group has been created for each of these committees, which allows the committee chair to easily e-mail his or her members. The Group function also allows the members to store computer files in a central location that all group members can access.

The main e-mail function has been used extensively by the officers and advisors, who use it to send out a mass e-mail to all members, which is especially useful for meeting reminders, calls for volunteers, etc. Also, meeting minutes, photographs, and other files of interest to the chapter are posted in the Course Documents section.

The response from the chapter has been largely positive, and from the standpoint of managing the chapter, the advisors and officers are very happy with Blackboard. The only complaint that has been raised is that ASCE no longer has a homepage for visitors to view. However, Blackboard can be set up such that a Guest login can be made available, which will allow visitors to access much of the chapter's material.

4.5 *Communication Across the Curriculum*

Students enrolled in Introduction to Environmental Engineering during the Spring 2002 semester were required to give a 10-minute presentation on a current environmental engineering topic once during the semester. These presentations were videotaped, digitized, and made available to students via a shared network drive. The intention was that after students viewed their own presentation, they would download a form from Blackboard's Course Documents page to grade themselves. After filling in the form, the students would upload the form using the Digital Dropbox. Also, each presentation would be critiqued by two other students, who would also download the form, fill it in, and return it on Blackboard. These reviews and the instructor's review would then be combined and returned to the student via the Digital Dropbox.

The potential impact on student learning is substantial, since reviewing one's own presentation is a powerful learning tool, and being critiquted by others can be very helpful. Moreover, the process of providing constructive criticism on another student's presentation can also be a learning
experience. However, the process required a large amount of work to set up, and due to the end-of-the-semester "crunch," the process was not completed. Students did review their speeches and provide a critique of their presentation and two other's via Blackboard, but a compilation of these critiques and the instructor's opinions were never made available to the students.

5 Future Applications

Blackboard has several interesting features beyond those already mentioned which we plan on incorporating into these and other classes. The most intriguing of these are the assessment tools – quizzes and surveys.

One of the most potentially useful and time-saving features is the online quizzes. In CE 373, reading assignments with specific reading objectives have been assigned. Periodic pop quizzes were administered to check that students were doing the reading. However, losing 10 minutes of several lectures to give the quizzes and taking 1-2 hours to grade each quiz are significant drawbacks to this assessment method. The Blackboard online quizzes offer a solution to these problems.

Blackboard quizzes can be written with many types of questions. Images can be added to the questions or the answers. Standard-answer questions such as True or False, multiple choice, and ordering will be automatically graded. Short answer and essay questions must be graded by the instructor.

Quizzes can be made available to students at any time and for any length of time. Students have a set length of time, such as five or ten minutes, to take the quiz. Lecture time could be saved by requiring students to take quizzes on their own time. The instructor can allow students to take the quiz multiple times or only once and can provide feedback (e.g. inform students of the correct answers or additional messages). Scores are automatically added to the gradebook. If there are problems that require individual grading, the instructor or grader can easily access the files and enter the score for these problems. The total score is then summed and entered in the gradebook. The time savings during lecture and in grading are enormous.

Another similar feature is the surveys. Similar to quizzes, surveys can be written with many types of questions. Students take the survey, and the results are automatically compiled. Surveys can be a good way to assess the level of students' knowledge and abilities; however, the time required to summarize the results is often a turn-off. With Blackboard surveys, the results are automatically compiled – all you have to do is come up with the questions.

Blackboard will also collect information on how students use Blackboard. The information provided includes the time each student spends on Blackboard, which parts of Blackboard they use most frequently, and the overall usage by time of day and day of the week. While this is not directly a teaching aid, it can provide useful information to the instructor about the students and how to better use Blackboard to enhance a class.